



***Technology
for the Warfighter***
Defense Manufacturing Conference
November 27, 2001

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 074-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 11/27/2001	3. REPORT TYPE AND DATES COVERED Briefing 11/27/2001	
4. TITLE AND SUBTITLE Technology for the Warfighter: Defense Manufacturing Conference			5. FUNDING NUMBERS	
6. AUTHOR(S) Sega, Dr. Ronald M.				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Department of Defense			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; Distribution unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (Maximum 200 Words) Briefing given by Dr. Ronald Sega about the direction for Defense research and engineering.				
14. SUBJECT TERMS IATAC Collection, warfighter, DoD, technology, readiness			15. NUMBER OF PAGES 19	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	

Quadrennial Defense Review (QDR)

September 30, 2001



- **Move From “Threat-Based” to “Capabilities-Based” Planning**
- **Key Military-Technical Trends of Adversaries**
- **Exploit R&D to Maintain Decisive lead in Technologies**
- **Develop & Exploit Technologies**
- **Reduce Cycle Time**

“Protecting the American Homeland From Attack is the Foremost Responsibility of the U.S. Armed Forces...”

Under Secretary of Defense (Acquisition, Technology & Logistics)



Goals

- **Achieve credibility and effectiveness in the acquisition and logistics support process**
- **Revitalize the quality and morale of the DoD Acquisition, Technology, and Logistics workforce**
- **Improve the health of the defense industrial base**
- **Rationalize the weapon systems and infrastructure with the defense strategy**
- **Initiate high leverage technologies to create the warfighting capabilities, systems, and strategies of the future**

Direction for Defense Research and Engineering



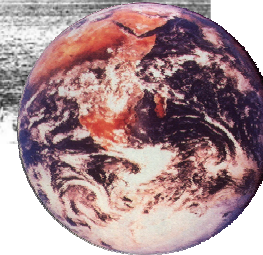
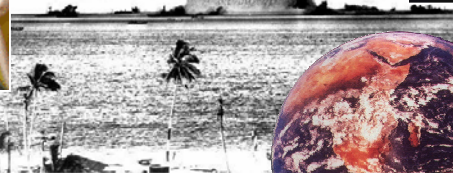
- **Enable future DoD capabilities through an integrated technology program**
- **Accelerate technology transition to the warfighter**
- **Enhance near term technical support**
- **Revitalize the DoD laboratories**
- **Develop, attract and retain a quality national security technical workforce**



Strategic Environment

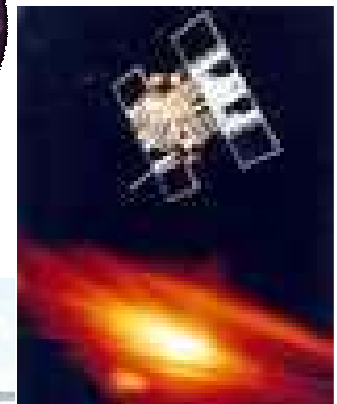
Global US Interests

Political - Economic - Humanitarian

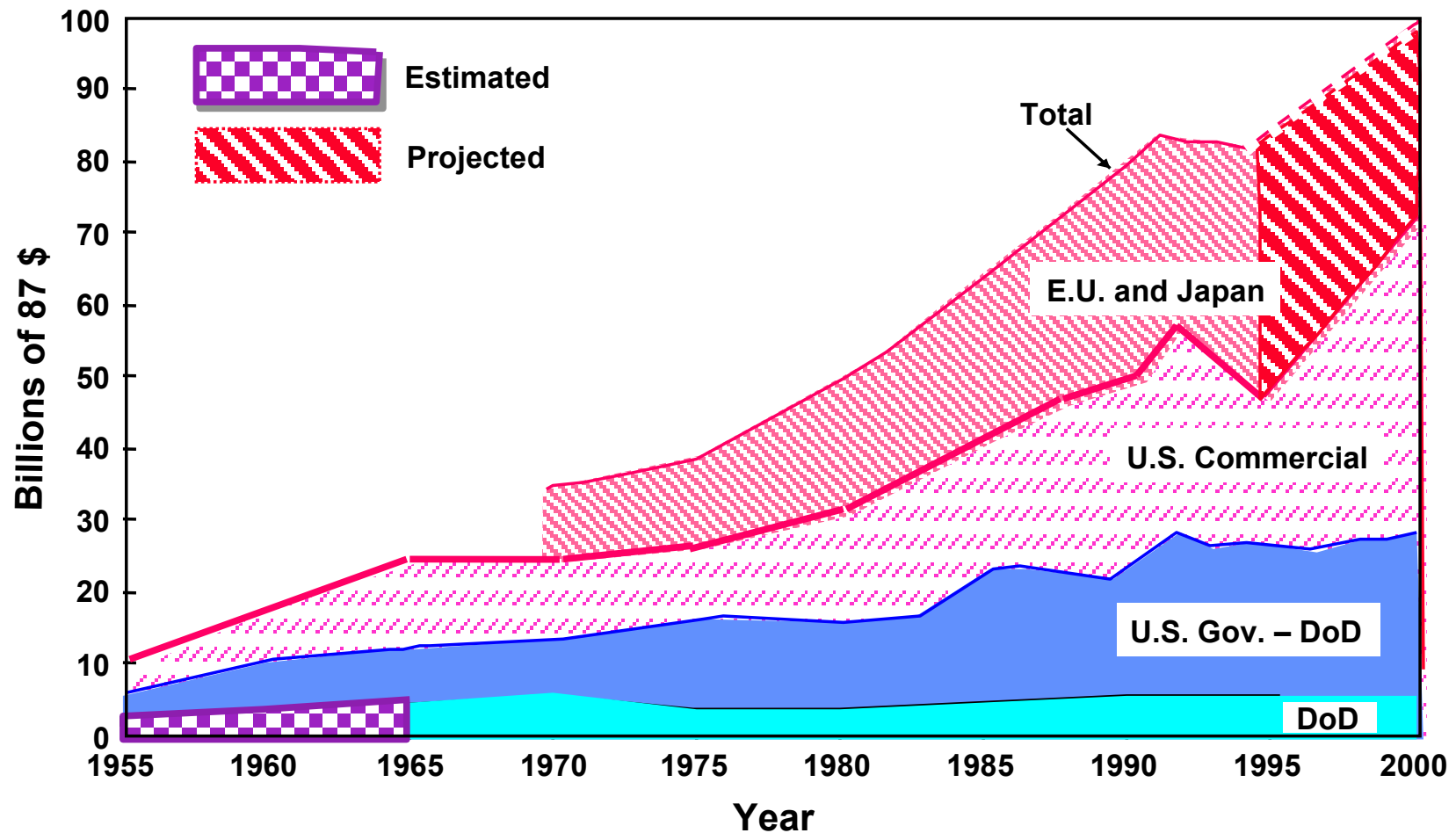


Asymmetric Threats

In any domain - Air, Land, Sea, Space or Information



U.S. and Worldwide Research Base since WWII



Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation



FY02 RDT&E Budget Request

**FY02 RDT&E = \$47.2B
requested
(6.1 thru 6.7)**

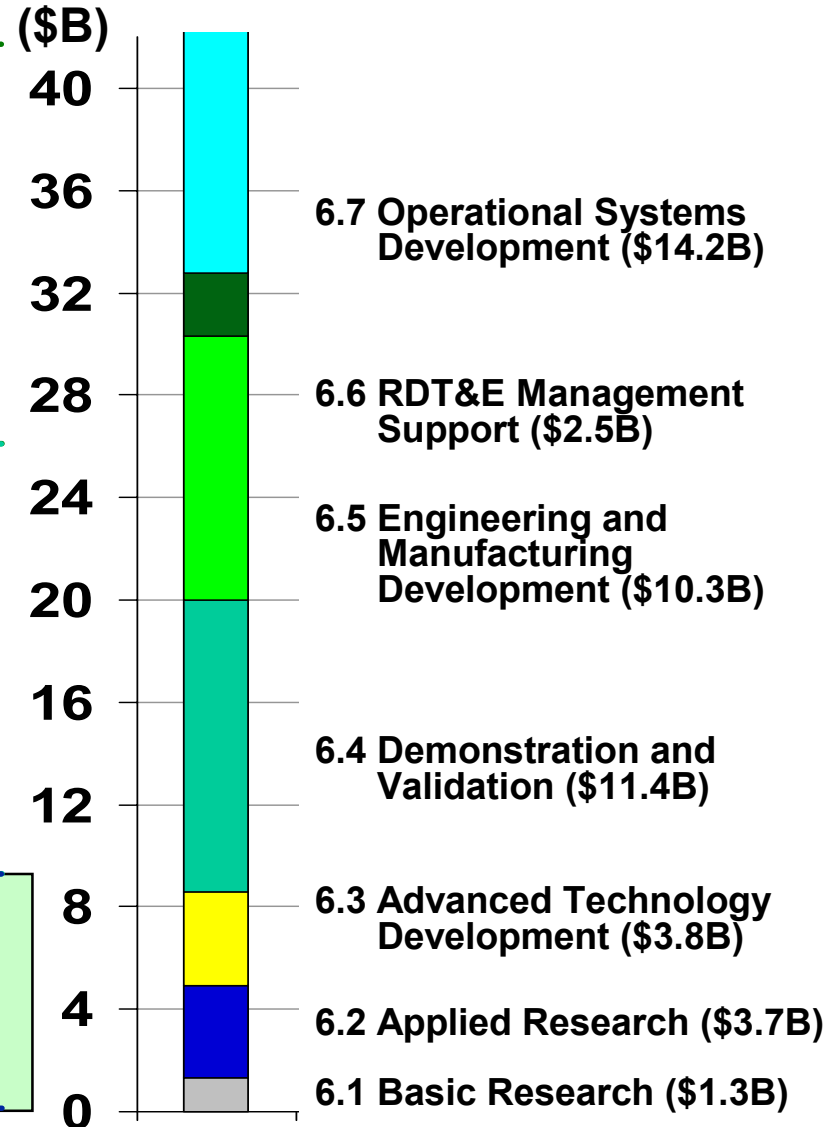
(6.6 + 6.7 = \$16.7B)

**Development
(6.4 + 6.5 = \$21.6B)**

**Technology Base
(6.1 + 6.2 = \$4.9B)**

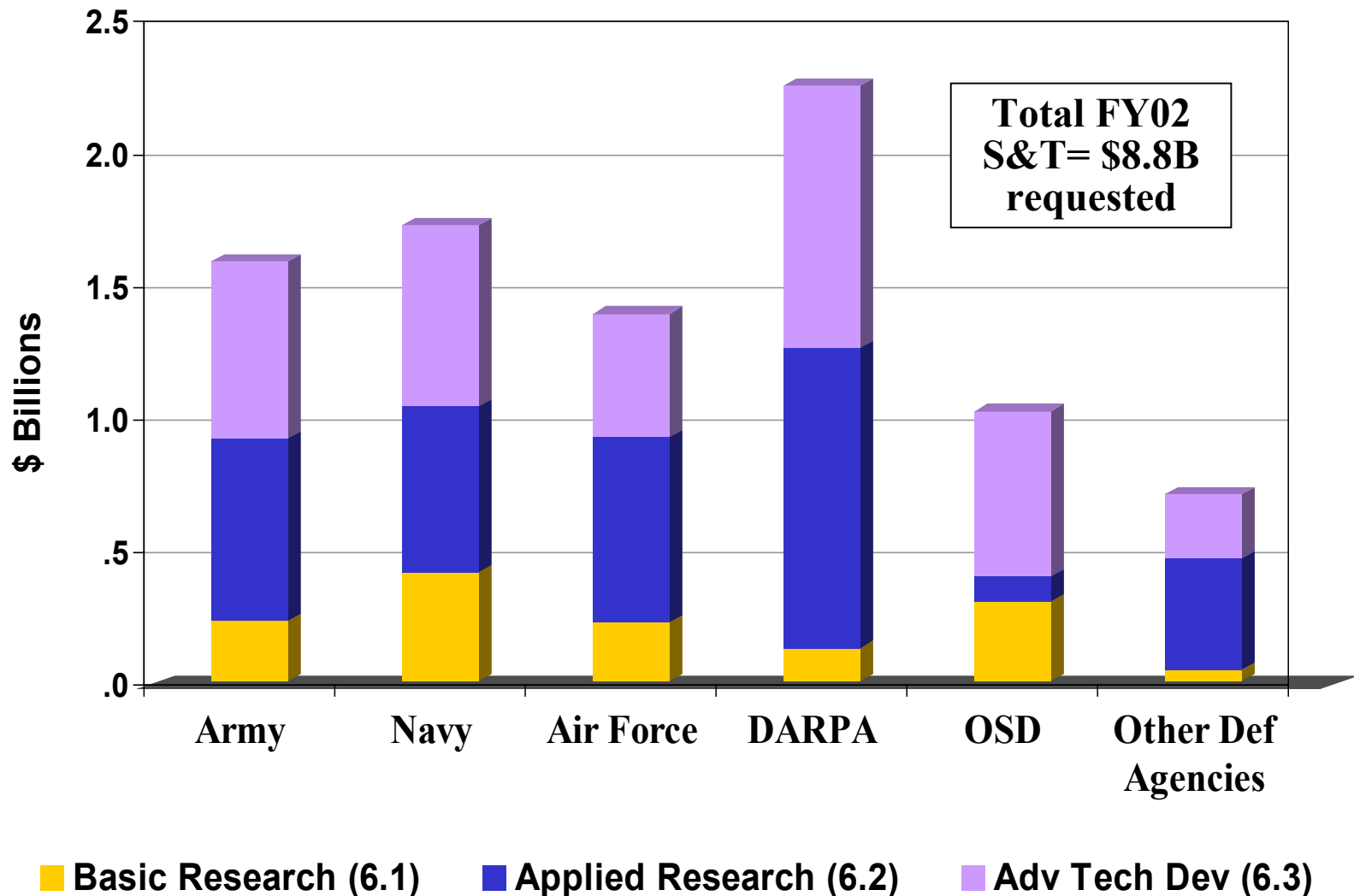
**Science and Technology
(6.1 + 6.2 + 6.3 = \$8.8B)**

19% of RDT&E





FY02 Budget Request DoD S&T





Science & Technology Priorities

Technical

- Basic Research
- JV 2020 Capabilities
 - Chemical & Biological Defense
 - Information Assurance
 - Hardened & Deeply Buried Targets
 - Smart Sensor Web
 - Cognitive Readiness
- Revolutionary Capabilities
 - High Energy Laser
 - Electric Drive
 - Autonomous Systems
- Enabling Capabilities
 - Propulsion
 - Software Intensive Systems
 - High Performance Computing
 - Modeling & Simulation

Non-Technical

- Funding Stability
- S&T Workforce
- **Technology Transition**
 - Technology Readiness Assessments
 - Technology Readiness Levels

DoD 5000-Series

S&T Role in Evolutionary Acquisition



- **DoDD 5000.1**

- Rapid Transition From S&T to Products
- Emphasis on Affordability

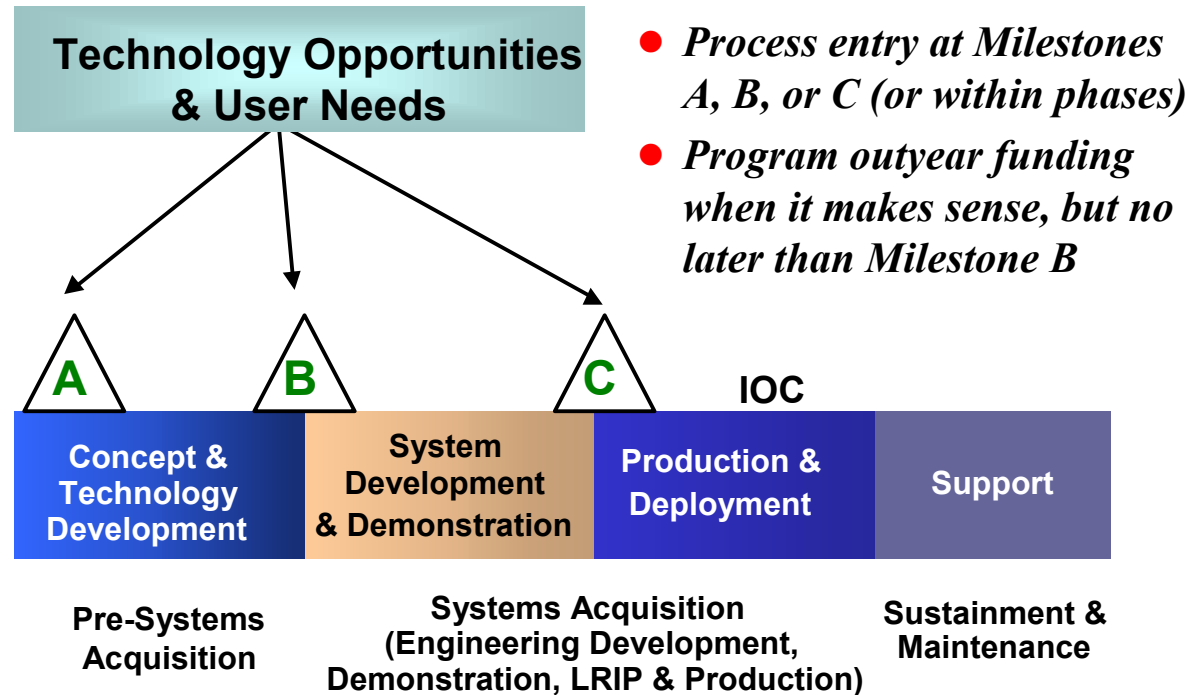
- **DoDI 5000.2**

- Focus on S&T Solutions in Pre-Acquisition
- Use Mechanisms with User & Acquisition Customer to Ensure Transition

- **DoD 5000.2-R**

- Conduct Technology Readiness Assessment for Critical Technologies

Defense Acquisition Management Framework



Documents Available At
<http://www.acq.osd.mil/ara/>

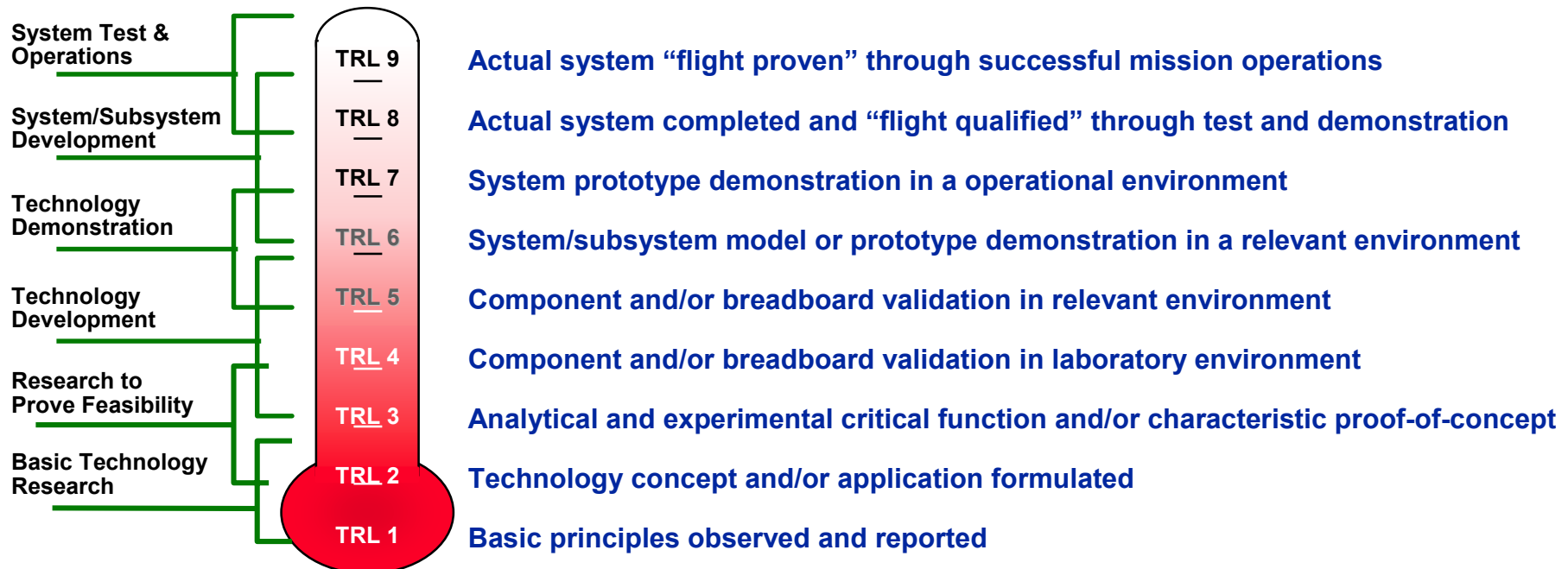
DoD 5000.2-R

Assess Technology Maturity



- Technology Readiness Assessments (TRAs) for Critical Technologies
 - Use Technology Readiness Levels (TRLs), or Some Equivalent
- TRAs Conducted by the Services & Agencies (Except Joint Programs)
- Assessments Evaluated by the Dep Under Sec of Defense (S&T)
- Findings Forwarded to the Overarching IPT and Defense Acq. Board

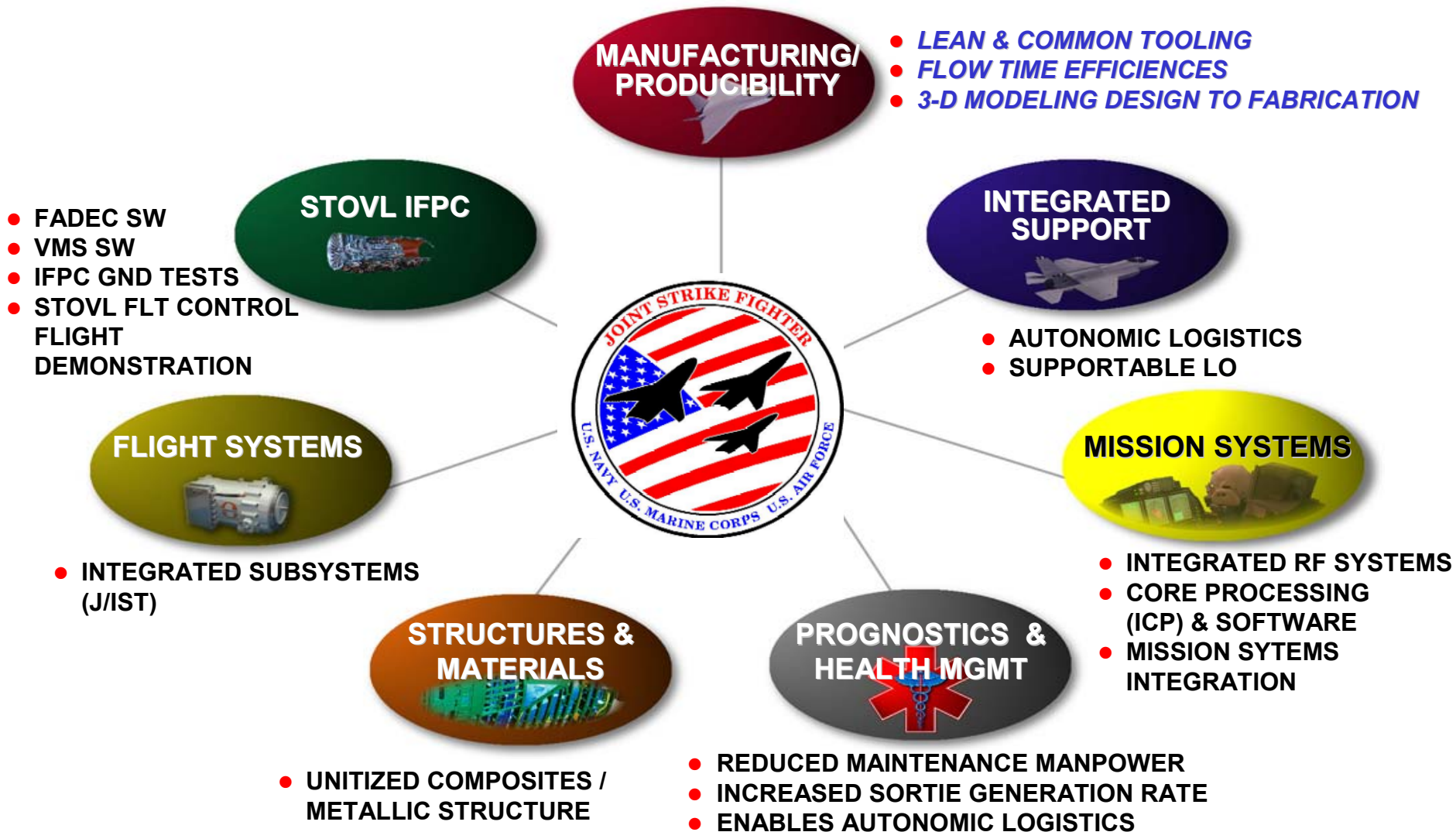
Technology Readiness Levels (TRLs)



Technology Readiness Assessment (TRA)

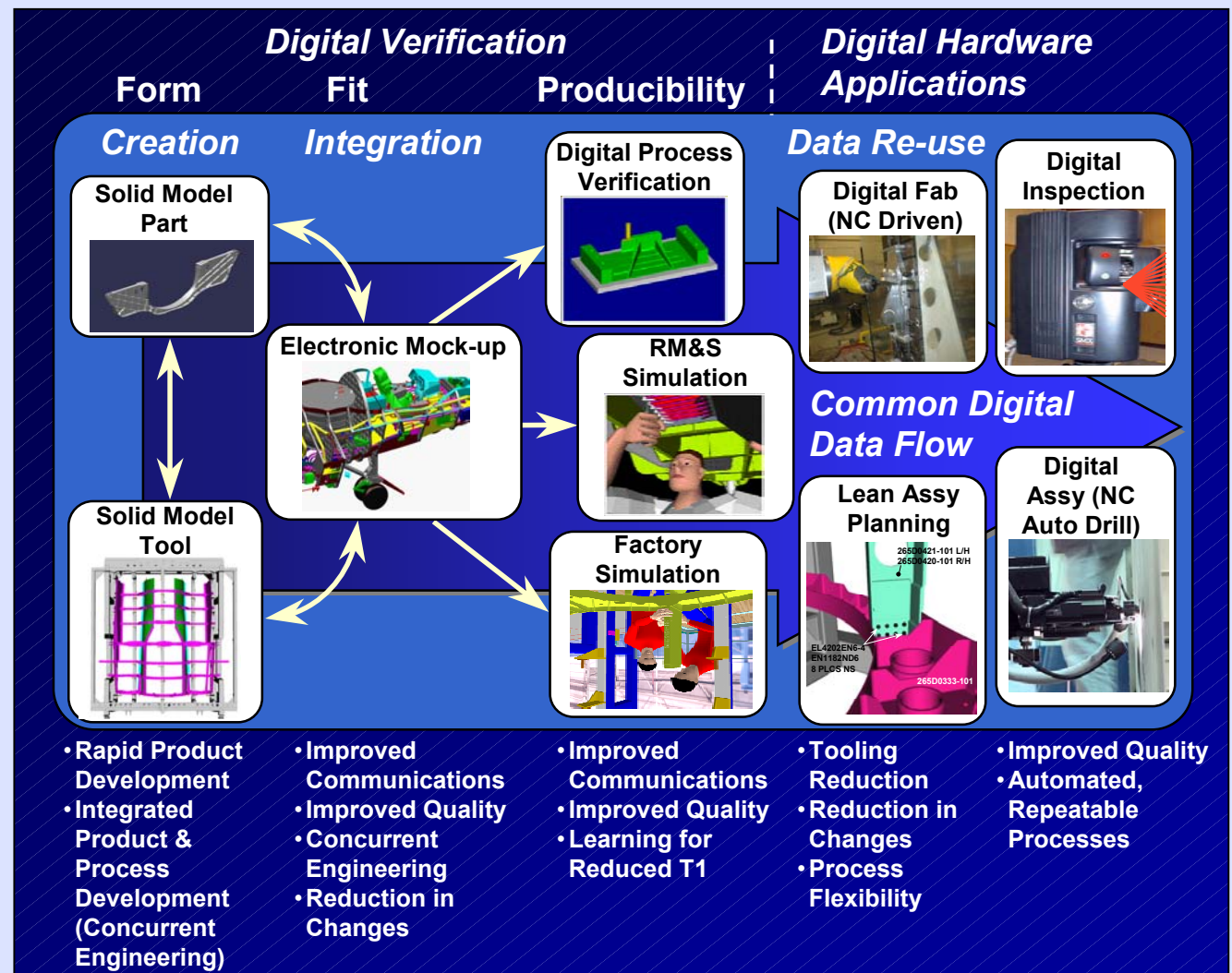


Example: Joint Strike Fighter (JSF)



JSF Digitally Driven Product Design & Manufacture

- **Solid Model Data**
 - NC Ready Models
 - Reduced Span Time
- **Data Re-Use**
 - Eliminates Interpretation Error
 - Reduce Task Span Times
- **Digital Product/Process Verification**
 - Form, Fit, & Producibility Verified Prior to Assembly
 - Improved Quality
 - Reduced Cost and Reduced Risk



Digital Data Data Re-use Eliminates Errors, Drives Down Cost

Air Force Manufacturing Technology (ManTech) Program: F-22 Impact



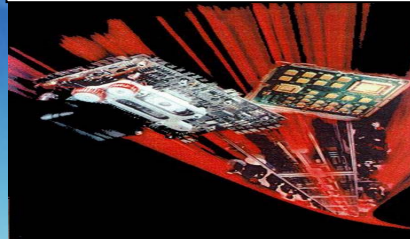
Integrally Bladed Rotors (IBR)

- Reduced Part Count From 87 to 1
- Reduced Weight 54lbs



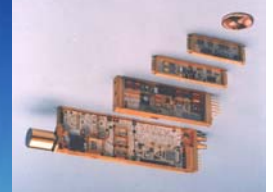
Comm/Nav Modules

- Potential \$120M Cost Avoidance



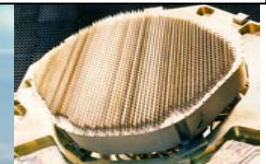
T/R Modules

- Reduced Cost 90%



Subarray Interconnects

- \$80M Cost Avoidance



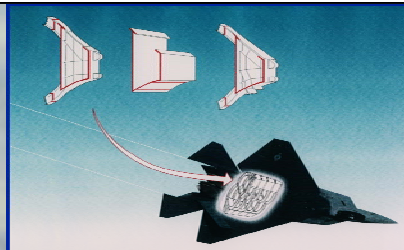
Laser Shock Peening

- Reduced Cost \$10K / Blade
- Increased Throughput 6X



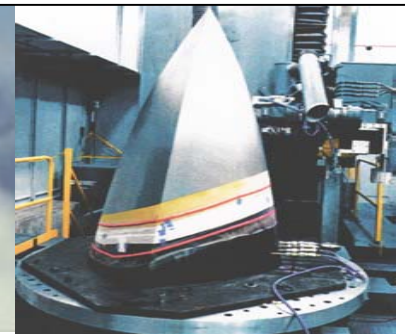
Welded Titanium Structure

- Potential \$100M Cost Avoidance



Multi-Function Radome

- \$50M Cost Avoidance
- Reduced Cycle Time 50%



Other ManTech Initiatives

- Lean Manufacturing
- Digital Product Models
- Ultra-thin Castings





Army ManTech

Enhanced Manufacturing Processes for Body Armor Materials



Plate Forming: Siliconized Silicon Carbide



Plate Forming: Boron Carbide



- **Objective:** Develop & Implement Economical Production of Ceramic / Composite Small Arms Protective Plates for Personnel Protection

- **Participants:**

- Army Natick Soldier Center
- PM, Soldier Systems
- Marine Corps
- Simula Safety Systems Inc.
- CERCOM Inc.



*Interceptor Body
Armor Jacket*

- **Benefits:**

- Stops Rifle / Machine Gun Fire
- 55% Lighter, 60% Lower Cost Compared to Armor Plates
- Cost Avoidance (NPV): \$193M

- **Implementation:**

- Over 50K Plates Delivered & Fielded; 140K Plates on Contract
- Supports “Operation Enduring Freedom”

Bottom Line: Warfighter Capability



*Right Materiel, Right Place,
Right Time, at the Right Cost -*

All The Time



BACKUPS

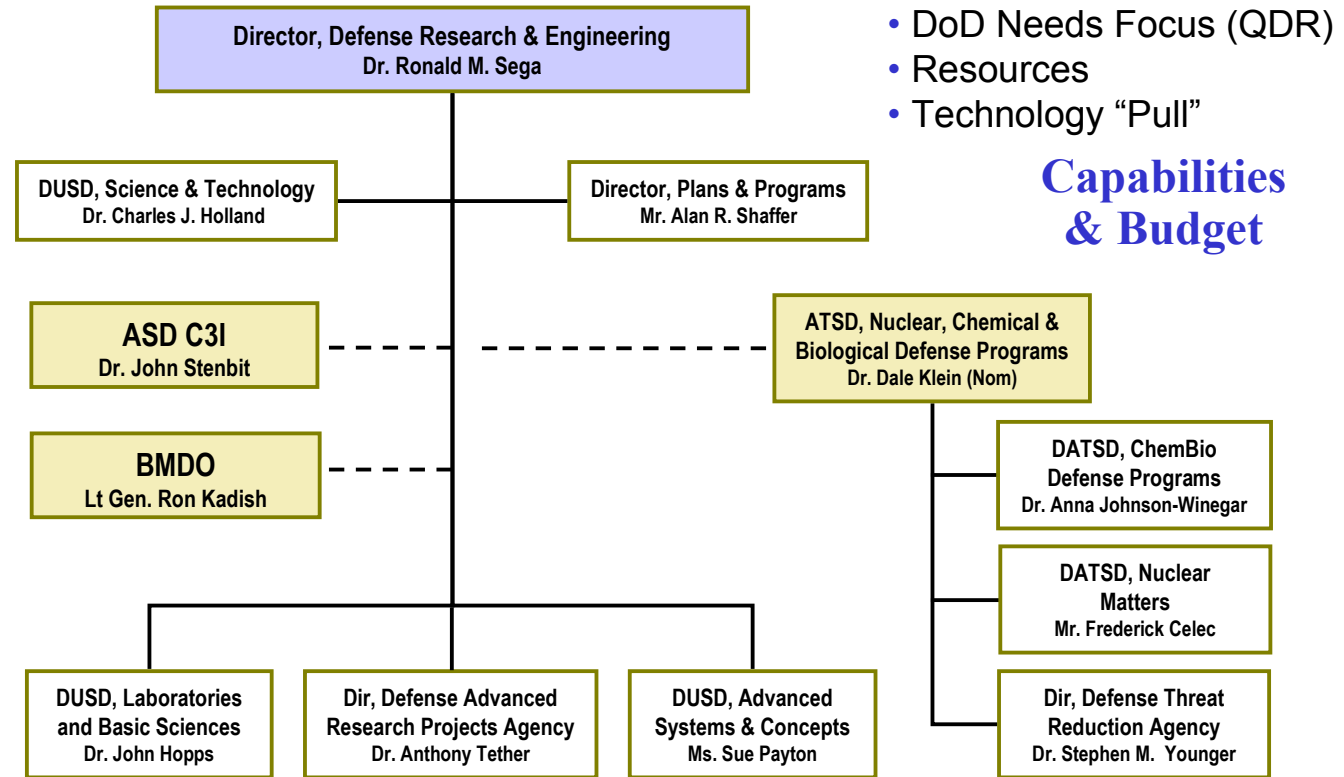
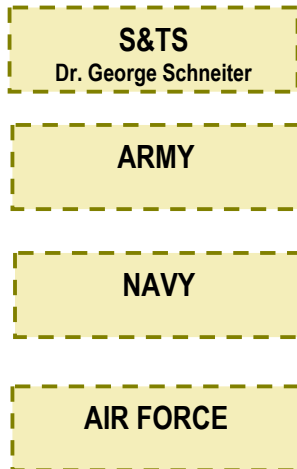


DDR&E Organization

Integrated Approach to Technology in DoD

CTO

- Technology Areas**
- Planning
 - Oversight
 - Review Programs across Services and Agencies
 - Technology “Push”



Capabilities & Budget

Projects and Systems

- Efficient Technology Transition
- Synergy and Integration of S&T Efforts
- Mutual Support for Programs within DoD (and outside of DoD as appropriate)

Navy ManTech Impact on V-22



ManTech Project	Benefit
Heat Treatment for High-Performance Transmissions	Increased Power Density and Loss of Lube Tolerance
Thermoplastic Bearing Cages	Reduced Weight by 60%
T406 Engine Vane Actuators Powder Injection Molding	Life-cycle Cost Avoidance up to \$1.5M
Resin Impregnated Honeycomb Core Structures	Excellent Impact Resistance and Lighter Structure
Fiber Steering for Lightweight Composites	Improved Structural Efficiency
Gear Metrology & Performance Prediction	Reduced Vibration and Gear Wear
Hi-Speed Gear Inspection	Reduced Gear Inspection Time
Non-Contact Work Piece Positioning	Enhanced Precision Machining
Powder Metal Processing of T406 Turbine Disks	Life-cycle Cost Avoidance up to \$19M
In-Situ Composites Fiber Placement	20% Reduction in Fabrication Costs
Smart Sensors/Actuators	Increased Operational Capabilities
Ausform Finished Gears	Increased Gear Durability
Superalloy Casting Technology:	Reduced Manufacturing Costs

***Life-Cycle Cost Avoidance
Exceeds \$45M***



Payoff

- Weight Reduction
- Increased Maintenance Cycle Time
- Improved Performance